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10/501,145	07/13/2004	Lieven Anaf	016782-0310	5358

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FOLEY AND LARDNER LLP  
SUITE 500  
3000 K STREET NW  
WASHINGTON, DC 20007

EXAMINER
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SCULLY, STEVEN M

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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06/18/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



<b>Office Action Summary</b>	<b>Application No.</b> 10/501,145	<b>Applicant(s)</b> ANAF ET AL.	
	<b>Examiner</b> Steven Scully	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,6-17 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6-17 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |



**POROUS METAL STACK FOR FUEL CELLS OR ELECTROLYSERS**

Examiner: Scully    S.N.: 10/501,145    Art Unit: 1795    June 15, 2010

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 2, 2010 has been entered. Claim 5 has been canceled and claims 1 and 4 have been amended. Accordingly, claims 1, 2, 4, 6-17 and 20 remain pending in the application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Objections***

3. Claim 6 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In particular, claim 1 requires "said second metal fiber layer having fibers with an equivalent diameter smaller



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than 10um" whereas claim 6 requires "less than 30um". Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 4 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not disclose a perpendicular air permeability of less than  $200 \text{ l/min} \cdot \text{cm}^2$ . The original disclosures are all related to  $\text{l/min} \cdot \text{dm}^2$ , particularly, for example,  $200 \text{ l/min} \cdot \text{dm}^2$ . See page 7, lines 4-10 of the instant specification (WO2003/059556).

***Claim Rejections - 35 USC § 103***

6. Claims 1, 2, 4, 6-17, 19 and 20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Sounai et al. (US4,554,225) in view of Cisar et al. (US6,562,507).

With respect to claims 1, 13 and 16, Sounai et al. disclose a fuel cell a stack of unit cells, each having a cathode (14) and an anode (15), which each comprising a first porous layer (18) and a second porous layer (19). (Note: first and second porous layers



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of Sounai are interpreted to be the second and first metal fiber layers of claim 1, respectively.) The first porous layer (18) comprises a sintered body of a fibrous nickel, and has a porosity of 60-80%. The second porous layer comprises a sintered body of a fibrous nickel. See column 4, lines 36-52. Adjacent the electrodes are bipolar plates (12). See Figure 1. Sounai et al. disclose the second porous layer to have fibrous metal having a diameter of 25um and further disclose the first porous layer to have fibrous metal having a diameter of 4um. See column 6, lines 5-23. While the second porous layer of Sounai et al. in Example 1 has a porosity of 75%, Sounai et al. disclose the porosity can be 60-80% and it is the position of the Examiner that one would expect an average diameter generally equivalent to that of 75% porosity for variations thereof. Further, absent a showing of unexpected results, it is the position of the Examiner that the equivalent diameters are not critical.

Sounai et al. do not disclose the bipolar plates and the electrodes to be sintered together. Cisar et al. disclose a stack comprising an impermeable metal structure (see claim 1, column 10, lines 44 to 45), one first metal fiber layer and one second metal fiber layer made of sintered metal fibers (see claim 2, column 10, lines 56 to 59), said impermeable metal structure being sintered to one side of said first metal fiber layer (see claim 1, column 10, lines 46 to 47), said second metal fiber layer being sintered to the other side of said first metal fiber layer (see claim 7). Cisar et al. further disclose that sintering provides full conductivity of the metal to be realized to provide superior performance. See column 6, lines 33-43. It would have been obvious to one of ordinary skill in the art to sinter the conductive materials of Sounai et al. together to



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provide for full conductivity for superior performance. Sounai et al. disclose the porosity of the second porous layer is 60-80%. A *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough (for example, 80% and >80%) that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). Further, it is the position of the examiner that the specific ranges of the porosity of the first and second metal fiber layers are not critical.

Sounai et al. in view of Cisar et al. do not explicitly disclose the planar air permeability. However, it is the position of the examiner that Sounai et al. disclose metal fiber layers which have the porosities claimed. Air permeability is a function of porosity, pore size and the distribution of the porosity. It is the position of the Examiner that absent any discussion otherwise, one of ordinary skill in the art would expect the porous body of Sounai et al. made in Examples 1 and 2 to have generally even distribution of porosity throughout, as this would be directly related to the diameter and aspect ratio of the fibrous metal used, which are the same fibrous metal throughout each layer. Sounai et al. disclose both small pore sizes and large pore sizes. See Column 6, lines 5-22. Thus, because Sounai et al. disclose metal fiber layers having the porosities as claimed, an even distribution of the porosity and both large and small pores, it is the position of the examiner that a layer of Sounai et al. would inherently have a planar air permeability of more than 0.02 l/min\*cm. Inherency is not established by probabilities or possibilities. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51.



With respect to claim 2, Sounai et al. disclose a stack of bipolar plates and electrodes, wherein each bipolar plate is directly adjacent two electrodes. See Figure 1.

With respect to claim 4, Sounai et al. in view of Cisar et al. do not explicitly disclose the perpendicular air permeability of the second metal fiber. However, it is the position of the examiner that for those reasons as discussed above with respect to the planar air permeability of claim 1, the second fiber layer of Sounai et al. in view of Cisar et al. would inherently have a perpendicular air permeability of less than 200 l/min\*cm<sup>2</sup>. Inherency is not established by probabilities or possibilities. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51.

With respect to claim 7, Sounai et al. disclose the second porous layer to have a thickness of 0.7mm. See column 4, lines 49-52.

With respect to claim 8, Sounai et al. disclose the electrodes are, for example, 1mm thick. See column 4, lines 36-37. Also, Sounai et al. disclose the ratio of the thickness of the first and second porous layers is about 1.0:3.2. See column 6, lines 41-42. This yields approximately 0.2mm thickness for the first porous layer.

With respect to claim 9, Sounai et al. in view Cisar et al. are silent with regard to said stack having a transversal electric resistance less than  $30 \times 10^{-3}$  Ohm. Cisar et al. disclose that the component or subassembly provides a metal structure having higher electrical conductivity than conventional bipolar plates or stack structures (see column 6, lines 18 to 20). It would have been obvious to one of ordinary skill in the art at the time of the invention to reduce the electric resistance in order to achieve higher



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electrical conductivity in the metal structure. Higher electrical conductivity in the invention can reduce the number of parts in the unit and thus making it lighter in weight.

With respect to claims 10-11, Sounai et al. disclose the bipolar plate (12) to be stainless steel. See column 4, lines 53-54.

With respect to claims 12 and 14, Sounai et al. are silent as to the metal fibers being stainless steel or titanium. Cisar et al. disclose forming gas diffusion layers from nickel, stainless steel, titanium and combinations thereof. See claim 23. It would have been obvious to one of ordinary skill in the art to substitute stainless steel or titanium because one of ordinary skill in the art would have reasonable expectations for the substitution to yield predictable results. *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. \_\_\_, 82 USPQ2d 1385 (2007).

With respect to claim 15, Sounai et al. in view Cisar et al. disclose a stack as in claim 1, said metal fibers having the same alloy of said impermeable metal structure by combining all three structures into a single unitary metallic part which includes gas distribution structure by sintering, the gas diffusion structure, and the gas barrier structure (see abstract, lines 8 to 11 of Cisar et al.). It would have been obvious to one of ordinary skill in the art to sinter as discussed above with respect to claim 1.

With respect to claim 17, Cisar et al. disclose using electrochemical cells in an electrolyser, and it is well known in the art that stack assemblies can be used in a fuel cell or an electrolyser, thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use the stacks of claim 1 in an electrolyser.



With respect to claims 19-20, Sounai et al. disclose the first and second porous layers may be each 60-80% porous. Thus, for example, Sounai et al. disclose the second porous layer is 80% porous while the first porous layer is 60% porous.

### ***Response to Arguments***

7. Applicant's arguments filed April 2, 2010 have been fully considered but they are not persuasive. Applicant argues:

*a) Example 1 of Sounai et al. cannot be relied upon to disclose or suggest the features of claims 1.*

The Examiner respectfully disagrees. Example 1 shows average diameters of fibers in the first and second porous layers that are different between the layers but both result in a porosity of 75%. Sounai et al. further disclose that the porosity can be 60-80% and thus it is the position of the Examiner that, though the first porous layer of Sounai et al. is disclosed to have a porosity of 75%, one of ordinary skill in the art would be capable to make it range anywhere from 60-80% as generally disclosed.

*b) Sounai et al. does not inherently have the planar air permeability of claim 1.*

The Examiner respectfully disagrees for the reasons as discussed above with respect to claim 1. Applicant states the air permeability can be determined by means of the porosity of the fibrous layer and the equivalent diameter of fibers in the layer, which notably corresponds to the previous discussion above. Regarding the maximum pore size, it is unclear what is to be taken from the graph's discussion; in particular, it is unclear how Sounai having a maximum pore size which is much greater than their



actual pore size is pertinent to the planar air permeability, which is said to be determined by means of the porosity of the fibrous layer and the equivalent diameter of fibers in the layer. Presently, it remains the position of the Examiner that the rejection is proper.

***Contact/Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Scully whose telephone number is (571)270-5267. The examiner can normally be reached on Monday to Friday 7:30am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571)272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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/S. S./

Examiner, Art Unit 1795

/Dah-Wei D. Yuan/

Supervisory Patent Examiner, Art Unit 1795